

# Photosynthesis Lab

## Pre-Lab Analysis:

1. Read the prompt on p.13 of your notes. **EXPLAIN** the correct answer choice for questions 15-19 on p.14 in your notes.
2. Review the introduction below and **describe** the dependent variable & independent variable to be included in your figure.
3. In general, as  $ET_{50}$  increases, **what is the rate of photosynthesis trend?**
4. What is the **null hypothesis** you will be testing?
5. Construct a **data table** to have ready for lab data collection next class.

## Background:

Photosynthesis can be measured by a variety of methods but we will measure it by the floating leaf technique. Leaves are naturally filled with gases such as oxygen & carbon dioxide that make them float in water. We will saturate the leaves with an aqueous solution of water & sodium bicarbonate (a source of carbon dioxide) that will result in their sinking in water. Once sunken, we can expose them to light and allow photosynthesis to occur. As photosynthesis occurs, water will be used and produce oxygen gas. As the oxygen gas accumulates in the leaf, it will cause the leaves to become buoyant again and they will begin to float up through the water.

Through repeated experiments, a value called  $ET_{50}$  has been established as a reliable value to represent photosynthetic activity. ET stands for “Estimated Time” and 50 means 50% of the leaves. Basically, the time taken for 50% of the leaves to be floating at the surface is equal to  $ET_{50}$  and is a reliable value for photosynthetic rate. The higher the  $ET_{50}$ , the SLOWER photosynthesis is occurring since higher time values mean more time required and thus a slow process.

In this lab you will test light intensity as a variable of photosynthesis. You will conduct the experiment with a lamp 1cm away from the leaf beaker and also at 10cm away from the leaf beaker. The purpose of the lab will be to determine if light intensity has an effect on photosynthetic rate.

## **Procedures:**

\*\*\* Each group has 2 lamps, divide tasks accordingly so you complete the data collection within the class period.

1. GROUP MEMBERS 1 & 2: Prepare the lamp setups by securing the lamps above two 300mL beakers so that the edges of the lamps will be the selected distances above the beakers. Turn on the lamps to warm up.
2. GROUP MEMBER 3: Punch out 20 leaf disks with the metal disk cutter.
3. GROUP MEMBER 4: Add 3.5g sodium bicarbonate to 250mL water to both beakers and dissolve sodium bicarbonate completely. Add 2 drops of soap to each beaker, stir GENTLY so no suds form.
4. ANY GROUP MEMBER: Saturate 10 leaves with the prepared beaker solution and get them to sink using plunger method demonstrated. Dump saturated leaves into one of the beakers. Repeat with the other 10 leaf disks and put into the second beaker. Add water slowly to each beaker to bring total volume to 300mL.
5. Place beakers under lamps and **start 2 timers, one for each beaker experiment**. Record the time taken for the **5<sup>th</sup> leaf** to reach the surface of each beaker. If no leaves are floating within 5 minutes, try again with another leaf sample.
6. When finished both trial, dump solutions in drains and rinse off/dry all materials.
7. Record data for all groups in class.
8. Input data into t-test website for analysis. Use the standard deviation to calculate standard error for figure error bars.

Construct a lab report using the general guidelines.